

CLAIMS

1. An antenna device comprising:

a resonance element array having a plurality of resonance elements arranged therein, and having a circuit connected to each of the resonance elements, the circuit provided therein, and the circuit for controlling a resonance frequency of the resonance elements;

a primary radiator for radiating an electromagnetic wave for excitation to the resonance element array or for receiving an electromagnetic wave radiated from the resonance elements; and

collimating means of a lens or reflector disposed such that the position of the resonance element array is a focus plane.

2. An antenna device comprising:

a resonance element array having a plurality of resonance elements resonating at a fixed frequency arranged therein, and having variable reactance circuits connected to the resonance elements, respectively, whose reactance changed by an applied voltage, the circuits provided therein;

a control portion for controlling a voltage to be applied to the variable reactance circuits;

a primary radiator for radiating an electromagnetic wave for excitation to the resonance element array or for receiving an electromagnetic wave radiated from the resonance elements; and

collimating means of a lens or reflector disposed such that the position of the resonance element array is a focus plane.

3. An antenna device as claimed in claim 2, wherein, by

controlling an applied voltage to the variable reactance circuits, the control portion makes resonance elements at fixed positions operate as a wave director out of the plurality of resonance elements and changes the resonance elements at the fixed positions to resonance elements at other positions.

4. An antenna device as claimed in any one of claims 1 to 3, wherein the primary radiator contains a plurality of primary radiators so that the radiation position to the resonance element array may be optimized or the position for receiving an electromagnetic wave radiated from the resonance element array may be optimized.

5. An antenna device as claimed in any one of claims 1 to 3, wherein the primary radiator contains an opening hollow resonator and an excitation source for exciting the opening hollow resonator.

6. An antenna device as claimed in any one of claims 1 to 3, wherein the plurality of resonance elements are linear conductors which are substantially perpendicular to the arrangement direction and extend parallel to each other.

7. An antenna device as claimed in any one of claims 1 to 3, wherein the plurality of resonance elements are linear conductors which are substantially 45 degrees tilted to the arrangement direction and extend parallel to each other.

8. An antenna device as claimed in claim 2 or 3, wherein a variable capacitance diode changing the load reactance to the resonance element is contained in the variable reactance circuit, and wherein the control portion applies a reverse bias voltage to the variable capacitance diode.

9. An antenna device as claimed in claim 2 or 3, wherein a switching element for switching the load reactance to the resonance element is contained in the variable reactance circuit, and wherein the control portion applies a control voltage to the switching element.

10. An antenna device as claimed in claim 2 or 3, wherein an MEMS element where the distance between electrodes is changed by a control voltage is contained in the variable reactance circuit, and wherein the control portion applies a control voltage to the MEMS element.

11. An antenna device as claimed in claim 9, wherein the switching element is an MEMS element where a switching control between electrodes is performed by a control voltage.

12. An antenna device as claimed in claim 1 or 2, wherein the primary radiator is an electronically controlled wave director array antenna in which a feed element is disposed in the center and non-feed elements having a reactance loaded therein are disposed around the feed element.

13. A radio device comprising an antenna device as claimed in any one of claims 1 to 3.

14. A radar comprising an antenna device as claimed in any one of claims 1 to 3.